1988 ANNUAL REPORT

The Coordinating Committee of Maritime Electric Utilities

presented to

The Council of Maritime Premiers

Maritime Electric Company,Limited

New Brunswick Power

Nova Scotia Power Corporation

THE COORDINATING COMMITTEE OF MARITIME ELECTRIC UTILIITES

1988 ANNUAL REPORT

TO

THE COUNCIL OF MARITIME PREMIERS

90-07045/

1989 09 08

Premier J. M. Buchanan
Premier F. J. McKenna
Premier J. A. Ghiz

Sirs:

It is with pleasure that we, the members of the Co-ordinating Committee of Maritime Electric Utilities, submit our Annual Report.

The Co-ordinating Committee of Maritime Electric Utilities (CCMEU), having now completed its eighth full year of operation, feels that its efforts are contributing to the achievement of full co-operation among the region's electric power utilities.

We also believe that CCMEU serves a useful role in identifying, discussing and quantifying the benefits of such co-ordination for the Council of Maritime Premiers.

Respectfully,

J. H. Reynolds
Chairman, CCMEU
Maritime Electric Company, Limited

Frank MacLoon
Member, CCMEU
New Brunswick Power

T. F. MacDonald
Secretary, CCMEU
Nova Scotia Power Corporation

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1.0 SUMMARY OF FINDINGS

1.1 General

The committee feels that the terms of reference provided by the Council continue to be satisfactory and will result in the ability to provide valuable information to both the Council and the Utilities in matters relating to the efficient regional development and operation of the Maritime Electric Power Systems.

The individual Operationg, Planning and Research and Development Subcommittee reports provide an overall appreciation of Committee results.

Highlights from these subcommittee reports reveal the following:

1.2 Regional Operating Subcommittee Report

Customers in the Region continued to receive more reliable service and reduced costs as a result of interconnected operation of the three utilities. Five hundred and ninety five million kilowatt hours of energy worth 19.3 million dollars was exchanged during the year. The benefit to member utilities from the exchange was 10 million dollars. These values are substantially lower than in 1987, due to continued lower oil prices and shortages of interruptible energy.

The coordination of maintenance activities to provide economies of operation and improved reliability continued during the year, and the standardization of generating costing and capacity testing helps to optimize utilization of existing electrical energy resources.

While awaiting the addition of new generating capacity in the northeast, the co-ordination of generating capacity during the winter peak has become critical, with utilities co-operating on capacity exchanges and contingency planning for system loads.

1.3 Regional Planning Subcommittee Report

The report summarizes the regional load forecast and load resources review for the Maritime Utilities.

The Regional Load Forecast is based on the forecasts of the individual utilities. Average growth rates over the years 1988/89 to 2002/2003 are expected to be 2.7% for energy and 3.0% for peak demand.

From a reliability viewpoint, the Load Resources Review indicates that there is an adequate level of generation reserves in the Maritime Provinces until the mid 1990's, assuming that currently-planned additions are undertaken.

1.4 Regional Research and Development Subcommittee Report

The Subcommittee reports greatly-improved dissemination of R&D information within the utilities as a result of the communications structure developed by the Subcommittee. Pooling of R&D resources and results is made whenever such activity will benefit the utilities in the region.

The main areas of R&D in the region in 1988 related to the following:

- thermal plant emissions reduction
- efficiency improvement and plant life extension
- new combustion technologies

A review of current R&D activity reveals the following projects in each utility:

1.4.1 New Brunswick Power

- Dalhousie Unit No. 1 - Orinoco Fuel Project demonstration
- Circulating fluidized bed demonstration project at Chatham
- Distributed-mixing coal burner development
- Retrofit variable-speed drive to an induced-draft fan
- Electrical testing of thermally-deteriorated converter transformer to determine remaining electrical strength
- Lightning ground flash density measurements in Canada
- Field trials of a galloping-control device for bundled-conductor lines
- High Voltage DC working group
- Application of herbicides to control unwanted vegetation on transmission right-of-way, capsule evaluation program
- test program for generic coal-water fuel
- develop knowledge-based systems for power restoration
- Chatham CFB wood-burning demonstration
- combustor mapping Chatham CFB
- mathematical modelling of CFB unit at Chatham

1.4.2 Nova Scotia Power Corporation

- Accelerated material evaluation of polymer insulators for transmission lines
- Circulating fluidized bed feasibility study
- Coal-liquid mixtures conversion feasibility study
- Control of distribution-line galloping
- Evaluation of CCA-PEG treated Scots pine poles
- Field testing of distribution equipment and line materials in a marine atmosphere
- Field testing of insulators and associated equipment on 25 kV distribution lines in a coastal salt environment

- Marginal cost-based peak load pricing and load control study
- Nova Scotia add-on plenum heater expriment
- Performance of preservative-treated white and red spruce poles
- Test burn of Nova Scotia coal and limestone at Chatham Circulating Fluidized Bed
- Coal gasification combined cycle study
- Fish diversion study at Hell's Gate Hydro Station
- Fish diversion studies at Annapolis Tidal Generating Station
- Herbicide capsule evaluation

1.4.3 Maritime Electric Company Limited

- Atlantic wind test site, North Cape, P.E.I.

2.0 THE COMMITTEE

The membership of the Committee shall consist of one representative, and an alternate, from each of the electric utilities. Observers delegated by each Provincial Government and the Federal Government may attend Committee meetings.

2.1 Committee Membership

Chairman
Mr. J. H. Reynolds
President and C.E.O.
Maritime Electric Company, Limited
P.O. Box 1328
Charlottetown, P.E.I.
C1A 7N2

Member
Mr. Frank MacLoon
President
New Brunswick Power
515 King Street
Fredericton, N.B.
E3B 4X1

Secretary
Mr. T. F. MacDonald
Vice President-Planning
& Environment
Nova Scotia Power
P.O. Box 910
Halifax, N. S.
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2.2 Observers To The Committee

G. Redmond
Deputy Minister, Cabinet Secretariat
P.O. Box 1617
Halifax, N.S.
B3J 2Y3

Douglas Cameron
Deputy Minister
Dept. of Energy & Forestry
P.O. Box 2000
Charlottetown, P.E.I.
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NEW BRUNSWICK REPRESENTATIVE:
To be appointed by the
New Brunswick Government

E. Martin Warnes
Director Electrical Energy
Technology
Energy, Mines and Resources
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580 Booth Street
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2.3 Alternate Committee Members

C. T. Flynn, (Alt. Member)
Senior Advisor
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P. H. Newcombe (Alt. Member)
General Manager
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P.O. Box 1328
Charlottetown, P.E.I.
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L. J. Sweett (Alt. Member)
Vice President - Customer Services
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2.4 Alternate Observer

Gerry D. Mendleson
Director, Legislative Affairs
Cabinet Secretariat
P.O. Box 1617
Halifax, N.S.
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2.5 Committee Terms of Reference

The responsibility, structure, and operation of the Committee is intended to ensure a continuing high degree of cooperative effort among the electric utilities of New Brunswick, Nova Scotia, and Prince Edward Island in the development and operation of an economic and efficient interconnected regional power system.

Responsibilities of the Committee shall include:

1) Development of coordinated load growth forecasts on an annual basis.

2) Identification and evaluation of regional electric utility development opportunities.

3) Development of optimum coordinated short and long range utility expansion plans.

4) Coordination of operations of the three utility systems with the objective of minimizing total regional generation costs, and improving security of supply.

5) Coordination of electric energy research and development, conservation and related activities of a regional nature.

6) Provision of a regional focus for operations coordination with neighbouring utility systems.

7) Such matters as may be referred to the committee by the Council.

The Committee shall meet at least quarterly with locations normally rotating among the three provinces.

The Committee shall submit a written report at least annually to the Council of Maritime Premiers.

2.6 Subcommittee Membership

2.6.1 Regional Operating Subcommittee

Chairman: P. H. Newcombe
Maritime Electric Company, Limited

Members: W. A. Patterson
New Brunswick Power

W. V. Wallace
Nova Scotia Power Corporation

2.6.2 Regional Planning Subcommittee

Chairman: J. L. Boomhower
Maritime Electric Company, Limited

Members: R. W. Brown
Nova Scotia Power Corporation

Ed Haggerty
New Brunswick Power

2.6.3 Regional Research and Development Subcommittee

Chairman: J. Kiuru
Nova Scotia Power Corporation

Members: J. A. Lea
Maritime Electric Company, Limited

Vince Corey
New Brunswick

1988

ANNUAL REPORT

REGIONAL OPERATING SUBCOMMITTEE

OF THE

COORDINATING COMMITTEE OF MARITIME ELECTRIC UTILITIES

Members:

P. H. Newcombe - Chairman	MECL
W. A. Patterson	NBEPC
W.V. Wallace	NSPC

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3.1 EXECUTIVE SUMMARY

This is the eighth annual report of the Regional Operating Subcommittee to the Coordinating Committee of Maritime Electric Utilities and describes the subcommittee's activities during 1988.

Customers continued to receive more reliable service and reduced costs as a result of interconnected operation of the three utilities. Five hundred and ninety-five million kilowatthours of energy worth 19.3 million dollars was exchanged during the year. The benefit to member utilities from the exchange was 10 million dollars. These values are substantially lower than 1987 due to continued lower oil prices and shortages of interruptible energy.

Working groups on maintenance practices and thermal generation costing continued their annual meetings. The co-ordination of maintenance activities provides economy of operation and improved reliability. The standardization of generating costing and capacity testing helps to insure the best overall utilization of existing electrical energy resources.

While awaiting the addition of new generating capacity in the northeast, co-ordination of generating capacity during the winter peak has become critical. The utilities co-operated in capacity exchanges and contingency planning for system peak loads.

3.2 RECOMMENDATIONS

It is recommended that the Regional Operating Subcommittee continue with the proposed activities for 1989 as described in Section 3.5.

3.3 TERMS OF REFERENCE

The Regional Operating Subcommittee shall consist of at least one member from each of the utilities in the Maritime region. The Subcommittee will meet at least twice yearly and will report to the Coordinating Committee of the Maritime Electric Utilities (CCMEU) at least twice yearly.

The Regional Operating Subcommittee shall undertake to do the following:

3.3.1 Monitor and report on activities within each utility with respect to changes in control and operating policy and practice.

3.3.2 Review, at least annually, the operating policies and practices in effect in the different utilities and determine if there are benefits of intergrating different operational aspects of the utilities.

3.3.3 Endeavor to determine the optimum dispatch of existing electrical energy resources on a regional basis including imports from outside the region and where beneficial, exports and report on any actions that the Subcommittee thinks could be beneficial to the utilities individually or collectively.

3.3.4 Attempt to identify and report on possible savings due to allocation of hydro on a regional basis and possible methods of sharing benefits from such allocation.

3.3.5 Submit minutes of Subcommittee meetings to the Secretary of CCMEU for distribution to CCMEU members and other Subcommittee members.

3.3.6 Submit a proposed work program and an expected budget requirement to the CCMEU by June 1 of each year.

3.4 ACHIEVEMENTS FOR 1988

3.4.1 Benefits from Interconnected Operation

Better service is provided to customers and at a lower cost through the interconnected operation of the three member utilities.

By agreement a member can call upon the generation reserves of another utility in the region for assistance in coping with a sudden emergency such as the tripping of a large generator or with a longer term problem such as disruption in fuel supply or a major problem with a generating unit resulting in a lengthy outage. Through sharing reserves the total amount of generation that is required on-line in the region at any given time is reduced and therefore the cost of providing reserve as well.

The largest saving to customers accrues from the interchange of energy between members on an hourly, weekly and monthly basis. These transactions are arranged whenever one utility has surplus energy which can be produced at a cost lower than the production cost of a neighboring utility. The benefit of the transaction is shared between the seller and the purchaser.

The volume of energy transactions between the members totalled 595 million kilowatthours in 1988. The transactions had a total value of 19.34 million dollars and provided a benefit of 10.04 million dollars to the members. These figures are down substantially from 1987 largely due to continued lower oil prices and less availability of economy energy for sale on the interconnected system.

INTERCONNECTION TRANSACTIONS

for period January 1, 1988 to December 31, 1988

Energy Transactions Between	Volume of Interchange (MWh)	Total Value of Transactions ($)	Benefits of Transactions ($)
N.B. Power to N.S. Power Corp.	70,700	1,780,000	1,376,000
N.S. Power Corp. to N.B. Power	50,800	2,586,000	702,000
N.B. Power to Maritime Electric Co.	473,216	14,927,000	7,955,000
Martime Electric to N.B. Power	492	48,000	9,000
	595,208	19,341,000	10,042,000

Benefits of Dalhousie participation agreement not included.

3.4.2 Generation Maintenance Scheduling

Generation maintenance scheduling plans were exchanged by the members and reviewed to allow production costs to be reduced and to ensure that adequate generation reserves are maintained.

3.4.3 Transmission System Maintenance

Personnel from the three member utilities meet annually to review common items of concern, provide coordination and future cooperation in relation to transmission maintenance. Specific items addressed included transmission line galloping, use of fibre optic cable for

protection/communication channels, solutions to rust problems, synthetic insulator and pincap insulator failures, maintenance test equipment, radio/T.V. interference and major equipment failures. Information on spare parts and specialized equipment is regularly updated.

During the year suggested governing principles covering emergency assistance arrangements were exchanged as well as formal Mutual Assistance Rosters. These Rosters identify contacts as well as personnel and equipment which could be made available by one member utility to another to provide emergency assistance in restoring service.

3.4.4 Dispatch Facilities

N. B. Power transferred operations to the new control room at the Energy Control Center in September. The System Control and Data Acquisition (SCADA) was completely transferred to the redundant Digital PDP 11/44 computers from what had been largely a one-on-one supervisory SCADA system. This forms the interim phase prior to an enhanced SCADA with Automatic Generator Control (AGC) and Energy Management System (EMS) being procured and placed in service. It is planned for this system to provide operating control for Distribution Operations as well as the bulk power system. It is expected to order the facilities by mid-1989 to be in service in 1991.

Maritime Electric completed the installation of a new point to point mobile radio system. This system will allow central dispatch of any line vehicle in the province. It will also allow any Maritime Electric vehicle to contact any other Maritime Electric vehicle in the province.

3.4.5 Optimum Dispatch of Electrical Energy Resources

During 1985 a Thermal Generation Working Group established by the Regional Operating Subcommittee developed standardized methods for determining electrical production costs for use in the interchange of energy. Difficulties were encountered in applying the methods to the individual utility systems due to differences in cost accounting e.g., one utility might have an historical record of particular costs on an individual generating unit basis while another utility recorded these costs on a total station basis. Efforts of the Working Group during 1986 focused on accommodations these differences and standardizing where possible. The new energy costing system was put in effect on 1 July 1987 by NBEPC and NSPC. Maritime Electric followed suit in early 1988.

The annual meeting of this group was held in Charlottetown in July 1988. The energy pricing guidelines document was reviewed and some minor suggestions for revisions were incorporated.

Unit emergency ratings were discussed with the conclusion that since they do not typically enter into energy interchange, they are an internal issue for each utility and are not required as part of the guidelines for pricing.

Since it is intended to implement revisions to incremental operating and maintenance costs yearly in July, it was agreed that subsequent meetings be held in June of each year.

3.4.6 Interconnection Facilities

Preliminary work started on the addition of a second transmission line from Memramcook to Murray Corner and the addition of a second reactor in P.E.I. so that the two 138 kV cables can be operated in parallel. The completion of this work will see double circuits from Memramcook to Charlottetown.

3.5. PROPOSED ACTIVITIES FOR 1989

3.5.1 Continue to evaluate and report on the annual benefits from interconnected operation.

3.5.2 Continue to exchange maintenance schedules of generation and major transmission facilities to enhance operating efficiency.

3.5.3 Update information exchanged on spare parts and apparatus for transmission facilities and specialized test equipment.

3.5.4 Continue work on sharing of tie line regulation.

3.5.5 Continue efforts associated with the joint dispatch of hydro.

3.5.6 Continue to monitor the working groups output.

ANNUAL REPORT

OF THE

PLANNING SUBCOMMITTEE

OF THE

COORDINATING COMMITTEE OF MARITIME ELECTRIC UTILITIES

JUNE 1989

Members:

P. H. Newcombe, MECL

R. W. Brown, NSPC

D. W. Bishop, NB Power

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4.1 SUMMARY

This is the eighth annual report of the Planning Subcommittee to the Coordinating Committee of the Maritime Electric Utilities. The report summarizes the Regional Load Forecast and the Load Resource Review.

The Regional Load Forecast is based on the forecast of the individual utilities. Average annual growth rates over the years 1988/89 to 2002/2003 are expected to be 2.7% for energy and 3.0% for peak demand.

The Load Resources Review indicates that, from a generation reliability viewpoint, there is an adequate level of generation reserves in the Maritime Provinces until the mid 1990's. The results are given in Table 7 and Figure 1.

4.2 RECOMMENDATIONS

It is recommended that the Planning Subcommittee continue with the proposed activities for 1989 as outlined in section 4.6 of this report.

4.3 TERMS OF REFERENCE

The Regional Planning Subcommittee shall consist of at least one member from each of the utilities in the Maritime Region. The Subcommittee will meet at least twice yearly and will report to the Coordinating Committee of Maritime Electric Utilities (CCMEU) at least twice yearly.

The Regional Planning Subcommittee shall, through whatever mechanism it deems necessary, Task Force appointment, consultant acquisition, etc., (subject to approval of CCMEU) undertake to do the following:

1. Prepare a load forecast showing the power and energy requirements of the region for approximately two decades. This load forecast shall be reviewed and updated, if necessary, annually.
2. Obtain the plans of the individual utilities and combine them to prepare a regional load-resource balance.
3. Identify possible benefits through short term deferral and/or advancement of provincially scheduled units and will so notify the CCMEU.
4. (a) Considering all feasible regional alternatives, prepare an optimum long term generation expansion plan (including major transmission when necessary) without regard to individual utility boundaries and without regard to proposed provincial units which have not been committed to construction. The development of any optimum expansion plan will always start with the then existing and committed facilities of the three Systems.

4.3 TERMS OF REFERENCE (Cont'd)

(b) Prepare a report comparing the optimum regional expansion plan with the sum of the individual expansion plans and report its findings to the CCMEU.

5. Periodically assess the potential for imports from outside the region or exports outside the region, the constraints imposed by existing transmission system limitations and will recommend the need or otherwise for studies of incrementing transmission capacity.

6. Submit a proposed work program and an expected budget requirement to the CCMEU by June 1 of each year.

4.4 WORK PROGRAM FOR 1988

The following is the 1988 work program as proposed in last year's Annual Report:

1. Produce a regional load forecast.

2. Produce the load resource balance for generation existing and under construction.

3. List potential future generation options available to the Maritime utilities.

4. Address additional requests of the Coordinating Committee as required.

5. Write a formal report on the subcommittee annual activites.

4.5 ACHIEVEMENTS FOR 1988

4.5.1 Regional Load Forecast

The individual Maritime utilities forecasts have been combined in Table 1 to give the Regional Load Forecast. Average annual compound growth rates for the period 1988/89 to 2002/2003 are 2.7% for energy and 3.0% for peak demand. The long term growth is slightly higher than last year with 2001/2002 presently forecast at 6015 MW/30923 GWh as compared to 5819 MW/30700 GWh.

Since the individual utility annual peak loads do not necessarily all occur at the same hour of the year, their arithmetic sum is usually greater than the annual peak load demand of the integrated regional system. A projection of future hourly loads of each of the three utilities has been combined to obtain the total peak load forecast for the region. The results are shown in Table 2.

Table 3 shows the regional monthly coincident peak demand and energy forecasts. The month of maximum peak demand and the month of maximum energy demand continues to be January.

4.5 ACHIEVEMENTS FOR 1988

4.5.1 Regional Load Forecast (Cont'd)

With all the uncertainties in the future variables which could effect the growth in electricity consumption, the forecast must be frequently updated, and can only act as a guide to utility planning.

4.5.2 Regional Load and Resources Review

The Load and Resource Review is intended to examine the ability of the regional utilities generating facilities to reliably meet the anticipated future demands of the customers.

4.5.2.1 Load Requirements

To allow for maintenance and account for forced or unexpected outages of generating units, the total generating capacity installed in the region must be greater than the regional load. This excess of generation over expected load is known as reserve. The load requirement to be met in the region consists of the forecast firm load plus a specified amount of reserve.

4.5.2.2 Resources

The generation resources are comprised of the total generation capabilities from both existing generating stations and those under construction. Listings of the resources are given by Province in Tables 4, 5 and 6.

4.5 ACHIEVEMENTS FOR 1988

4.5.2.2 Resources (Cont'd)

The resources consist of a mix of hydro, coal fired thermal, oil fired thermal, gas turbine and nuclear generation

4.5.2.3 Reserve Criterion

For the purpose of this regional examination, the following criterion has been applied to the combined NB, NS and PEI systems.

The reserve criterion requires that the total generating capacity available in each month be able to supply the load during the peak hour of the month with a surplus equal to 20% of the forecast firm load or the capacity of the largest unit, whichever is larger. To meet this criterion thermal and hydro generating units are considered as having been fully maintained prior to the peak demand period and, therefore, available at their full rated capabilities.

Although this criterion is a reasonable guide for regional reliability of supply, the final decision on the exact timing of new capacity may also take into consideration the energy production capability of existing hydro and the potential for support from ties to external systems.

4.5 ACHIEVEMENTS FOR 1988

4.5.2.4 Regional Electrical Capability Assessment

A comparison is made between the generation resources and the load required for each month of the study period. A surplus or deficit in the capability to supply is determined.

This assessment requires that generation reserve is added to the peak forecast load to determine the total peak load that would have to be met. This total load is compared with the sum of the generation supplies available from hydro, nuclear and fossil units to determine the surplus or deficit. In doing this calculation all generating units are considered to be available at their full net rated capability as given in Tables 4, 5 and 6. The results of this assessment are presented in Table 7 and Figure 1.

The available storage water for hydro generation is regulated in a manner to maximize the benefits on the system.

The combined load resource balance of the NB, NS and PEI systems has been carried out for each month of the year. This report provides only details of the peak load month in each year, since this condition has been used to

4.5 ACHIEVEMENTS FOR 1988

4.5.2.4 Regional Electrical Capability Assessment (Cont'd)

define the system surpluses and deficiencies and hence indicates from a reliability viewpoint when new generation is required.

For the purposes of determination of the reserve requirements, the largest unit in the region is as follows:

1. Until 1991/92 - Point Lepreau at 405 MW
2. After 1991/92 - Point Lepreau at 635 MW

4.5.3 Regional Generation Alternatives

Previous analysis and reports have demonstrated that the combination of the individual utility plans have provided a near optimum solution to required generation expansion. No new analysis has been undertaken this year to define additional expansion plans.

The following, however, does indicate the potential generating resources available to the Maritime utilities.

4.5.3.1 Conventional Hydro

In New Brunswick a potential exists for new hydro-electric projects to be built on the Saint John River at Grand Falls and just downstream at Morrell and

4.5.3.1 Conventional Hydro (Cont'd)

that they be operated together to assure a guaranteed firm output. An appraisal of the integrated development indicates that a 300 MW generating station could be constructed at Grand Falls beside the existing 60 MW plant. This new plant would operate as a pump storage development utilizing the Morrell headpond as the lower basin. Water would be pumped from the Morrell headpond to the Grand Falls headpond during off peak periods. This water would be used for generation through the Grand Falls plant during peak demand periods of the day. The Morrell development would contain four generating units with a total capacity of 140 MW. Other possible new hydro generation and storage sites exist throughout New Brunswick. In Nova Scotia there are no major hydro projects left to be developed. There are no potential hydro sites in Prince Edward Island.

4.5.3.2 Tidal

There are two tidal projects which continue to exhibit some potential of becoming economically viable. Site B9 across the mouth of Cobequid Bay has a potential capacity of 5000 MW and A8 across the Cumberland Basin has a potential capacity of 1400 MW. Both sites are large with respect to the region, are economically dependent on substantial export and have a minimum 10 year engineering and construction lead time.

4.5 ACHIEVEMENTS FOR 1988

4.5.3.3 Nuclear

Nuclear power remains a potentially economically acceptable base load option.

4.5.3.4 Natural Gas

This is not currently available to the region and should it become available it would likely only be to provide a short term market for gas by burning it in units such as Coleson Cove, Courtenay Bay or Tufts Cove.

4.5.3.5 Coal

Coal power is potentially economic and financially attractive in both new units and in the conversion of existing oil-fired units. Nova Scotia is currently building a 150 MW conventional pulverized coal-fired unit at Trenton and is committed to building a 150 MW CFB unit at Point Aconi. New Brunswick is in the final stages of commitment to a 450 MW unit to be located at Belledune. Several projects have been undertaken to investigate the feasibility of burning coal more economically and cleanly through the use of technologies such as coal washing, coal-water mixtures and fluidized bed combustion. The large reserves of indigenous coal resources makes these options particularly important to investigate.

4.5 ACHIEVEMENTS FOR 1988

4.5.3.6 Load Management

In this document load management refers to efforts to manage customer load by action initiated by the utilities to move consumption from peak to off-peak periods. The large amount of peak shaving capability provided by the regions' hydro resources tends to minimize the advantage of load management. However, it continues to be investigated.

4.5.3.7 Conservation

The need for energy conservation continues to be a major concern of the Maritime Utilities and all practical forms of conservation are considered such as incentive programs and educational programs.

4.5.3.8 Other

Alternate energy sources such as wood, biomoss, solar, wind, fuel cells, etc. have been investigated as generation sources but, to date, have not been chosen by the utilities to supply base load requirements.

4.6 PROPOSED ACTIVITIES FOR 1989

The activities proposed for 1989 are a continuation of the present work:

1. Produce a regional load forecast.

2. Produce the load resource balance for generation existing and under construction.

3. List potential future generation options available to the Maritime utilities.

4. Address additional requests of the Coordinating Committee as required.

5. Write a formal report on the subcommittee annual activites.

TABLE 1

MARITIME ELECTRIC UTILITIES

REGIONAL LOAD FORECAST

Fiscal Year	System Net Gwh[1)]	Peak Hourly MW
88-89	21825	4049 Actual
89-90	22310	4308
90-91	23522	4494
91-92	24198	4637
92-93	24890	4781
93-94	25546	4917
94-95	26186	5064
95-96	26870	5203
96-97	27548	5341
97-98	28223	5476
98-99	28884	5611
99-00	29566	5745
00-01	30238	5879
01-02	30923	6015
02-03	31623	6152

Total Period Averge Annual Growth Rate:

Gwh = 2.7%

MW = 3.0%

1) Includes System Losses

TABLE 2

MARITIME ELECTRIC UTILITIES

COINCIDENT PEAK LOAD FORECAST (MW)[1)]

FISCAL YEAR	N.B.	N.S.	P.E.I.	TOTAL	REGIONAL DIVERSITY	COINCIDENT REGIONAL LOAD
88-89	2303	1619	127	4049	264	3785 ACTUAL
89-90	2480	1734	132	4346	38	4308
90-91	2565	1835	136	4536	42	4494
91-92	2650	1891	139	4680	43	4637
92-93	2737	1947	142	4826	45	4781
93-94	2816	2003	144	4963	46	4917
94-95	2895	2070	146	5111	47	5064
95-96	2975	2129	148	5252	49	5203
96-97	3053	2188	150	5391	50	5341
97-98	3131	2247	152	5530	54	5476
98-99	3208	2305	154	5667	56	5611
99-00	3285	2363	156	5804	59	5745
00-01	3363	2422	157	5942	63	5879
01-02	3441	2479	159	6079	64	6015
02-03	3519	2539	160	6218	66	6152
Average Annual Compound Growth Rate %	3.1	3.3	1.7			3.5

1) Net System Firm Peak Load plus Interruptible Load

TABLE 3

MARITIME ELECTRIC UTILITIES

MONTHLY COINCIDENT LOAD FORECAST

DEMAND (MW)

FISC. YEAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	MAX
1989/1990	3341	3068	2838	2736	2778	2925	3164	3617	4074	4308	4154	3883	4308
1990/1991	3551	3265	3024	2917	2960	3113	3314	3789	4266	4494	4334	4057	4494
1991/1992	3651	3353	3107	2993	3036	3197	3404	3900	4396	4637	4469	4185	4637
1992/1993	3759	3451	3151	3074	3122	3288	3501	4019	4534	4781	4606	4315	4781
1993/1994	3863	3546	3282	3156	3204	3376	3594	4133	4666	4917	4736	4440	4917
1994/1995	3968	3640	3370	3237	3287	3465	3689	4247	4797	5064	4877	4573	5064
1995/1996	4081	3743	3464	3326	3377	3563	3793	4369	4938	5203	5011	4699	5203
1996/1997	4187	3841	3556	3412	3464	3656	3889	4487	5073	5341	5143	4825	5341
1997/1998	4295	3938	3648	3497	3552	3748	3988	4604	5206	5476	5274	4950	5476
1998/1999	4398	4034	3736	3581	3639	3839	4083	4717	5337	5611	5403	5073	5611
1999/2000	4503	4131	3826	3666	3725	3930	4180	4832	5466	5745	5532	5195	5745
2000/2001	4607	4226	3916	3751	3811	4022	4277	4947	5597	5879	5661	5319	5879
2001/2002	4713	4324	4007	3837	3899	4114	4374	5060	5727	6015	5791	5441	6015
2002/2003	4820	4421	4101	3923	3987	4209	4474	5177	5859	6152	5925	5569	6152

TABLE 3 (Cont'd)

MARITIME ELECTRIC UTILITIES

MONTHLY COINCIDENT LOAD FORECAST

ENERGY (GWH)

FISC. YEAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	MAX
1989/1990	1812	1670	1565	1531	1576	1616	1763	1944	2194	2315	2142	2182	22310
1990/1991	1926	1777	1670	1632	1679	1721	1847	2038	2298	2416	2239	2279	23522
1991/1992	1980	1826	1715	1674	1723	1766	1897	2097	2368	2492	2308	2352	24198
1992/1993	2037	1877	1762	1718	1768	1815	1949	2158	2439	2568	2377	2422	24890
1993/1994	2090	1926	1808	1761	1813	1861	1999	2215	2506	2637	2441	2489	25546
1994/1995	2142	1973	1852	1803	1856	1906	2046	2271	2572	2706	2506	2553	26186
1995/1996	2198	2024	1899	1848	1903	1955	2098	2332	2641	2779	2571	2622	26870
1996/1997	2253	2074	1948	1893	1950	2003	2151	2391	2710	2848	2637	2690	27548
1997/1998	2308	2125	1994	1938	1998	2052	2203	2450	2779	2919	2700	2757	28223
1998/1999	2362	2174	2041	1982	2044	2099	2254	2507	2845	2988	2765	2823	28884
1999/2000	2418	2224	2090	2027	2091	2149	2307	2568	2914	3058	2830	2890	29566
2000/2001	2471	2274	2137	2073	2139	2197	2358	2626	2981	3129	2895	2958	30238
2001/2002	2526	2325	2186	2120	2186	2246	2411	2685	3049	3200	2962	3027	30923
2002/2003	2583	2378	2236	2167	2236	2298	2465	2746	3117	3273	3029	3095	31623

TABLE 4

GENERATING STATION CAPABILITIES - NET MEGAWATTS[1] (MW)
EXISTING AND UNDER CONSTRUCTION
IN NEW BRUNSWICK

Hydro			Thermal			
Mactaquac	1	110	Grand Lake	5	5	
	2	110		6	5	
	3	110		7	15	
	4	116		8	57	
	5	113				
	6	113	Chatham	1	9	
Beechwood	1	36		2	20	
	2	36				
	3	41	Courtenay Bay	1	45	
				2	12	
Tobique	1	10		3	100	
	2	10		4	97	
Grand Falls	1	15	Dalhousie	1	103	
	2	15		2	183	2)
	3	15				
	4	15	Coleson Cove	1	335	
				2	335	
Milltown		4		3	335	
Sisson		9	Lepreau Nuclear	1	635	3)
Musquash		5	Moncton	1	22	
			Grand Manan		28	
Total Hydro		883 MW	Total Thermal		2341 MW	

1) Net megawatt values are derived by subtracting station service requirements from Gross Megawatt Capability.

2) Dalhousie unit 2 capability is reduced by 20 MW to recognize the joint ownership arrangement with Maritime Electric of Prince Edward Island.

3) Lepreau Nuclear available at 405 MW until 1991 10 31, 535 MW from 1991 11 01 to 1993 10 31, 585 MW from 1993 11 01 to 1994 10 31 and at 635 MW thereafter.

TABLE 5

GENERATING STATION CAPABILITIES - NET MW
EXISTING AND UNDER CONSTRUCTION
IN NOVA SCOTIA

HYDRO	MW	THERMAL	MW
		Point Aconi[2]	150
Annapolis Tidal	17[1]	Glace Bay	93
Avon	7	Lingan 1	153
Bear River	36	Lingan 2	153
Black River	20	Lingan 3	153
Dickie Brook	2	Lingan 4	153
Harmony	1	Point Tupper 2	149
Lequille	22	Trenton L.P.	40
Mersey	44	Trenton 5	144
		Trenton 6[3]	150
Roseway	1	Tufts Cove 1	83
St. Margarets	10	Tufts Cove 2	98
Sheet Harbour	10	Tufts Cove 3	153
Tusket	3	Maccan	13
Wreck Cove	223	Combustion Turbines	222
TOTAL HYDRO	379	TOTAL THERMAL	1907

1) The 17 MW Annapolis Tidal unit is not included as firm capacity because of the cyclic nature of the tide.

2) The Point Aconi CFB unit is scheduled to be in service 1993 11 01.

3) Trenton 6 is scheduled to be in service 1991 11 01.

TABLE 6

GENERATING STATION CAPABILITIES - NET MW
IN PRINCE EDWARD ISLAND

THERMAL	MW
Charlottetown	65
Borden	39
Summerside	10
Dalhousie 2 (NBEPC Purchase)	19
TOTAL	123

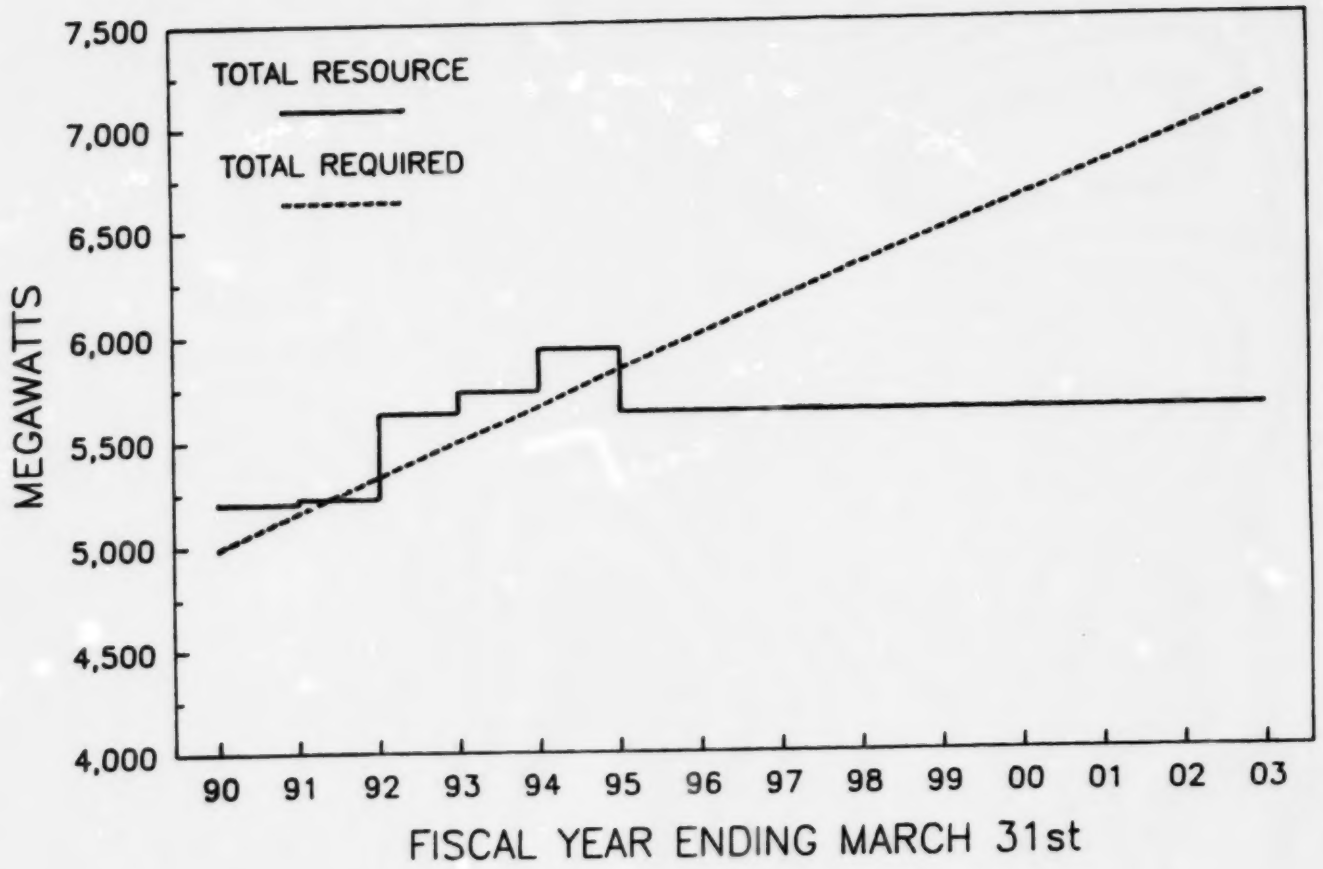
TABLE 7

MARITIME ELECTRIC UTILITIES
LOAD & RESOURCE REVIEW
(PEAK LOAD MONTH)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
DEMAND														
1. Forecast Load	4308	4494	4637	4781	4917	5064	5203	5341	5476	5611	5745	5879	6015	6152
2 Interruptible	203	205	208	211	213	215	219	222	224	227	230	233	236	239
3 Firm Load (1-2)	4105	4289	4429	4570	4704	4849	4984	5119	5252	5384	5515	5646	5779	5913
4 Required Reserve	821	858	886	914	941	970	997	1024	1050	1077	1103	1129	1156	1183
5 Non-Firm Contract	12	12	12	12	12	12	12	12	12	12	12	12	12	12
6 Firm System Sales	10	10	0	0	0	0	0	0	0	0	0	0	0	0
7 Total Demand (3+4+5+6)	4948	5169	5327	5496	5657	5831	5993	6155	6314	6473	6630	6787	6947	7108
RESOURCE														
8 Hydro	1263	1263	1263	1263	1263	1263	1263	1263	1263	1263	1263	1263	1263	1263
9 Nuclear	405	405	535	535	585	635	635	635	635	635	635	635	635	635
10 Purchases	100	125	250	350	350	0	0	0	0	0	0	0	0	0
11 Thermal	3436	3436	3586	3586	3736	3736	3736	3736	3736	3736	3736	3736	3736	3736
12 Total Resource (8+9+10+11)	5204	5229	5634	5734	5934	5634	5634	5634	5634	5634	5634	5634	5634	5634
13 Surplus/Deficit (12-7)	256	60	307	238	277	-197	-359	-521	-680	-839	-996	-1153	-1313	-1474

FIGURE I

MARITIME ELECTRIC UTILITIES
LOAD AND RESOURCE FOR PEAK LOAD MONTH



1988 ANNUAL REPORT

OF THE

RESEARCH AND DEVELOPMENT SUBCOMMITTEE

OF THE

COORDINATING COMMITTEE OF MARITIME ELECTRIC UTILITIES

MARCH 1989

Members:

J. Kiuru, Chairman,	NSPC
J. A. Lea	MECL
V. E. Corey	NB Power

4133M

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5.1 EXECUTIVE SUMMARY

This eighth annual report of the Research and Development Subcommittee of the Coordinating Committee of Maritime Electric Utilities (CCMEU) covers the Subcommittee's activities during 1988.

The dissemination of R&D information is greatly improved as a result of the communications structure developed by the Subcommittee.

During 1988, the Subcommittee continued to carry out its mandate as set forth in its Terms of Reference (Section 5.3). A summary of the Subcommittee's achievements for 1988 is shown in Section 5.5 of this report.

The reports on the status of recently-completed and on-going R&D projects in the Maritime Electric Utilities are summarized in Section 5.7. Pooling of resources and results are made whenever such activity will benefit the utilities in the region.

The main areas of R&D in the region in 1988 related to the following:

(a) thermal plant emissions reduction
(b) efficiency improvement and plant life extension
(c) new combustion technologies (e.g. CFB)

5.2 INTRODUCTION

This is the eighth annual report of the Research and Development Subcommittee of the CCMEU which was formed in March 1982.

The summary of 1988 activities and the proposed activities for 1989 demonstrate a continuing increase and improvement in cooperative activity in which the benefits of R&D in the Maritime Electric Utilities are being shared among member utilities.

The contents of this report reflect the continued commitment by CCMEU and its member utilities to promote a regional approach to R&D within the Maritime Provinces.

5.3 TERMS OF REFERENCE

The Regional R&D Subcommittee shall consist of at least one member from each of the province-wide utilities in the maritime region. The Subcommittee will meet at least twice yearly and will report to the Coordinating Committee of the Maritime Electric Utilities (CCMEU) at least twice yearly.

5.3 TERMS OF REFERENCE (Cont'd)

The regional R&D Subcommittee shall undertake the following:

5.3.1 Report on all electric utility-related R&D activities that are currently underway in the Maritime provinces.

5.3.2 Set up procedures whereby it is informed of any individual utility initiatives in R&D activity and attempt to achieve regional interest and participation in these activities.

5.3.3 Promote and implement the free exchange of R&D project information, procedures and results in order to share the results of all R&D projects undertaken by each utility. Recommend joint projects when such cooperation would benefit the region.

5.3.4 Review current and planned R&D expenditures by the member utilities and to recommend how maximum regional benefit can be obtained from these expenditures; this would include, but not be limited to the recommending against duplication of R&D effort.

5.3.5 Review the current and propsed R&D participation by member utilities in the CEA R&D program, and recommend actions which will enhance the regional benefit of these projects. This includes the possibility of joint proposals and joint bids on R&D contracts by member utilities.

5.3.6 Review R&D activity undertaken by utilities in Canada that is outside the umbrella of the Canadian Electrical Association and obtain the results of that activity for regional use.

5.3.7 Recommend to the CCMEU those R&D initiatives that the Subcommittee thinks should be taken within the region.

5.3.8 For projects which are identified by all member utilities to be of regional interest, but which cannot be funded by CEA and other R&D Funding, the Subcommittee shall request funding by the member utilities through the CCMEU.

5.3.9 Submit minutes of Subcommittee meetings to the Secretary of CCMEU for distribution to members of the CCMEU and its other Subcommittees.

5.3.10 Submit a proposed work program and an expected budget requirement annually to the CCMEU as directed.

5.4 WORK PLAN FOR 1988

5.4.1 To continue to share results of individual R&D projects.

5.4.2 To continue to investigate and recommend areas where joint participation in R&D projects is possible.

5.4 WORK PLAN FOR 1988 (Cont'd)

5.4.3 To continue to interface with the Circulating Fluidized Bed technology developments in order to identify and promote relevant research which will involve and benefit the region.

5.4.4 To continue to follow developments in coal beneficiation studies through the activities of the Committee on Atlantic Coal, to ensure that maximum regional benefits and involvement, particularly in the area of economics, are realized.

5.4.5 To continue to update its survey of R&D activities being carried out by member utilities in accordance with its Terms of Reference.

5.4.6 To investigate the possibility of including reports on utility-related research carried out by others in the Maritime area e.g. provincial research organizations.

5.5 SUMMARY OF ACHIEVEMENTS - 1988

5.5.1 Circulating Fluidized Bed

The Subcommittee continued monitoring the R&D activities at the Chatham, N.B. Circulating Fluidized Bed and notes that significant progress has been achieved in adapting this technology to New Brunswick and Nova Scotia coals and limestones.

5.5.2 Coal Beneficiation

The Subcommittee has continued to follow and promote developments in coal beneficiation studies being carried out by the Committee on Atlantic Coal in order to ensure maximum regional benefits and involvement.

5.5.3 R&D Project Review

The Subcommittee has continued to develop a summary of the nature and funding levels of all utility-related R&D Projects undertaken or initiated within the region.

5.5.4 Update of Regional R&D Activity Report

The Subcommittee continued to update its survey of R&D activities within the region in accordance with its terms of reference. The latest results are contained in Section 5.7 of this report. A more complete reporting of the CEA utility research activity has been achieved with the listing of utility technical advisors and working group members.

5.6 PROPOSED ACTIVITIES FOR 1989

5.6.1 To promote and encourage research into all environmental aspects of energy development, encouraging the co-operation of all member utilities to pool their results for regional benefit.

5.6.2 To continue to interface with the Circulating Fluidized Bed technology developments in order to identify and promote relevant research which will involve and benefit the region.

5.6.3 To continue to share results of individual R&D projects.

5.6.4 To continue to investigate and recommend areas where joint participation in R&D projects is possible.

5.6.5 To continue to update its survey of R&D activities being carried out by member utilities in accordance with its Terms of Reference.

5.6.6 To investigate the possibility of including reports on utility-related research carried out by others in the Maritime area e.g. provincial research organizations.

5.7 STATUS OF CURRENT AND COMPLETED RESEARCH & DEVELOPMENT ACTIVITIES IN THE MARITIME ELECTRIC UTILITIES

5.7.1 NEW BRUNSWICK POWER

5.7.1.1 Dalhousie Unit No. 1 - Orinoco Fuel Project

Objective: Venezuela has extensive reserves of an extra heavy hydrocarbon known as Orinoco which has potential as a thermal plant fuel. The objective of this project is to develop and optimize the technology for the handling, storage and burning of this fuel in a commercial-sized unit such as Dalhousie Unit No. 1.

Description: NB Power has entered into an agreement with Lagoven, S.A., an operating subsidiary of Petroleos de Venezuela, S.A., the national oil company, to conduct a test burning of Orinoco fuel to be supplied by Lagoven, S.A. Modifications have been made to the Dalhousie Unit No. 1 to accommodate the handling and burning of this special fuel, with funding provided by the Venezuelan company.

Since this fuel is about one-third higher in sulphur content in comparison to existing fuel oil normally used at Dalhousie No. 1, limestone injection will be required at the top of the combustion chamber in an effort to reduce emissions.

This project could, if successful, result in this heavy fuel becoming a potential economic alternative fuel for NB Power's existing oil-fuel units.

Status: To date, approximately 350,000 barrels of Orinoco fuel have been burned. There were no significant handling problems. Combustion was very good with a stable flame. Better than 99.7% carbon conversion was achieved. With regards to emissions, opacity was approximately 5% and NOx approximately 0.25 lbs/10^6 BTU. The boiler showed some fouling, which impacts on capacity - partially due to the oil design and limited sootblowing. Limestone injection is expected to take place in the Spring of 1989.

Schedule: Further testing is expected during 1989

Funding: $17.5 million by Lagoven, S.A.

Contact: B.A. Kennedy, NB Power
506-684-3387

5.7.1.2 Circulating Fluidized Bed Demonstration Project

Objective: To demonstrate this technology on a utility system utilizing low grade fuels. A program of up to 8000 hours of burning over the next two years is currently scheduled. Fuels that will be burned include New Brunswick coal and oil shale, Nova Scotia coal,

wood and woodvastes and also other contracted test burns on a cost recovery basis. One contracted test burn, contracted in 1987 involves petroleum coke. CONOCO Inc. has supplied the coke for a demonstration burn to assess sulphur capture, carbon burnout, particulate and NOx emissions. This demonstration was completed in 1988. The facility will be available to perform tests on other fuels and sorbents. It is anticipated that the facility will attract interest from other Canadian and international parties, from which further test programs will develop.

Description: The construction of the new circulating fluidized bed at NB Power's Chatham generating station has been completed and is integrated with the existing 22 MW Unit No. 2 turbine/generator. The unit is to be used to demonstrate the combustion of fuel mixtures that will lower emissions. The technology promises up to 90% sulphur capture during the combustion process, thus enabling compliance with the federal government's new source performance guidelines.

Status: The CFB unit was completed and commissioned in the Fall of 1987. Approximately 4000 hours of test burns have been carried out to date, including tests for CONOCO, NS Power, and CANMET. Major problems with the baghouse and auxiliary equipment are mostly resolved. High quantities of limestone are required in order to achieve 90% sulphur capture.

Current work is aimed at reducing the limestone requirement and to this end, there have been significant improvements in December 1988. NB Power expects to carry out modifications to improve the cyclone and test alternative solids removal equipment. Wood burning equipment is expected to be installed during 1989 with waste wood burning demonstrations in late 1989 and 1990.

Schedule: The R & D test program which began in 1987 is expected to continue until July 31, 1990.

Funding: The completed capital cost was $42,300,000. Energy Mines and Resources Canada contributed approximately $37,000,000 and NB Power provided the remainder.

Contact: A.R. McKenzie, NB Power
506-458-4235

5.7.1.3 Distributed-Mixing Coal Burner Development

Objective: To test a series of coal/limestone fuel mixtures using New Brunswick and Nova Scotia coals in a 1 MMBTU/hr test rig to determine optimum combinations of air, fuel and combustion rate variables to reduce NOx and SOx emissions.

Description: Distributed-mixing combustion of solid fuels has been developed in the U.S. and elsewhere as a means of retrofitting existing coal-fired boilers to reduce emissions of nitrogen oxides by as much as 50%.

Status: Phase I of the project was completed in August 1986. Approvals for Phase II were received in 1987. The equipment was overhauled and tested. Preliminary fires were established in December 1988.

New Brunswick coal has been prepared and testing is expected in early 1989. Nova Scotia coal will be prepared and testing will continue through 1989.

Funding: $256,000 provided by Energy, Mines & Resources Canada

Contact: R. Pickles, NB Power
506-458-3049

5.7.1.4 Retrofit Variable-Speed Drive to an ID Fan

Objective: To retrofit and evaluate the addition of a 600-volt drive system to a 4160-volt application.

Description: The existing induced-draft fan at the Chatham Coal/Oil Shale Demonstration project is powered at 4160 volts. This project will provide an alternate feed to that motor through a standard 600 volt variable speed drive using input and output transformers. The study aspects of the project will concentrate on harmonic effects and efficiency.

Status: Equipment installation has been completed. Commissioning to start February 1989. Final Report completed March 1990.

Start: September 4, 1985

Finish: March, 1990

Funding: $175,000 CEA
CEA Project #524G524

Contact: A. Gunn, P. Eng., NB Power
506-458-4230

5.7.1.5 Electrical Testing of Thermally-Deteriorated Converter Transformer to Determine Remaining Electrical Strength

Objective: To evaluate the reduction in power transformer life as a result of continuous long-time overloading.

Description: Since 1983, NB Power has been involved in a change-out program of the converter transformers at the Eel River HVDC station following the failure of one unit. During repair following the fault, thermal degradation to both the valve and high-voltage windings was observed; even though the units had been in operation for only twelve years with a continuous overload of 10%.

Electrical testing was carried out by CGE at the Guelph Plant in September 1985. In general, the results were better than anticipated. As a result of these tests, the spare converter transformer was not rebuilt. This was a saving to NB Power of about $400,000. Further testing of paper samples taken from the tested transformer during the rebuilding program has been completed.

Status: All testing was completed during the first quarter of 1987 and the final report has been drafted and has been forwarded to CEA for approval.

Cost: $30,000

Funding: CEA - first $15,000 / balance by NB Power

Contact: M. N. Campbell P.Eng., NB Power
506-458-4220

5.7.1.6 Lightning Ground Flash Density Measurements In Canada

Objective: To conduct lightning ground flash density measurements in Canada.

Description: Many countries in the world have conducted extensive lightning ground flash density measurements and built up data banks to aid in the design of lightning protection. This project will undertake to perform a similar function across Canada using the CIGRE 10 kHz vertical aerial counter. NB Power is participating with CEA by setting up and monitoring the test sites in New Brunswick and providing a member to the Task Force guiding the project.

The results will more accurately define the isokeraunic levels across Canada and provide the basis for design parameters which could result in reduced transmission line costs without any loss in reliability.

Status: The lightning counters were received for installation during the Spring of 1989, with measurements being taken over the lightning season.

Cost: Total project $360,500

Funding: $350,000 CEA, $10,500 NB Power
CEA Project #179T382

Contact: D. E. Clark P.Eng., NB Power
506-458-4085

5.7.1.7 Field Trials Of Galloping-Control Devices For Bundled Conductor Lines

Objective: To record the performance of detuning pendulums as a device to control galloping on a horizontal twin bundle conductor 345 kV line.

Description: NB Power is a participating utility in this contract that CEA has with Ontario Hydro. Test site is Line 3006 Salisbury (NB) to Onslow (NS) on the Tantramar Marsh. Three spans are equipped with the detuning pendulums on one phase for comparison of performance to the other untreated phases. Observations are recorded on 8 mm movie film for analyses by the contractor.

Status: Field trials began in November, 1986.

Finish: Original schedule was to end in 1988. It has been extended to end in 1989.

Funded by:		
	CEA R&D	$127,000
	Contractor - Ontario Hydro	$ 32,000
	Total Project Cost	$159,000

Installation costs are not part of the contract funds. Installation costs contributed by NB Power $5,000.

Contact: Etienne Roussell, P. Eng., NB Power, phone (506)458-3306,

5.7.1.8 High Voltage D.C. Working Group - WG140 (Chairmanship)

Objective: To review current problems in the design, operation and maintenance of existing or planned facilities and recommend a plan of needed research. Upon acceptance of the plan, to draft the "Request for Proposal" for approval by the CEA R&D Transmission Committee.

Description: The Requests for Research Proposals are produced on the basis of prioritized needs after a review of inputs from the utilities, industry and the Transmission R & D Committee.

Active projects and position papers at any one time amount to approximately $250,000 per year.

Technical Advisors for the projects are recommended and results from the research work are reviewed for appropriate action.

Status: 1. Projects in Progress

1.1 ST-327 (HVDC 6) HVDC Adaptive Digital Control (A position paper):

1.2 ST-316 (SVC 1) Geomagnetic Induced Current Effect on SVC Operation (A position paper):

1.3 212T506A Reliability Assessment of HVDC Transmission Configuration: Computer Program Development (HVDC 5)

1.4 203T421 HVDC Wall Bushing Testing.

1.5 ST174 Forced Commutation Techniques (A position paper)

1.6 314T527 Hydrid AC/DC Structure

1.7 214T565 Field Tests/Performance Assessment of M.O. Gapless S.A. for 250 kV DC (Liaison with WG112 and WG223)

2. Future Work Schedule

2.1 HVDC 12 Effect of SVC Harmonic Generation to HVDC Control System Performance

2.2 HVDC 17 TRV Problem due to Filter/Capacitor

2.3 HVDC 16 Parametric Studies of Operation with Low Short Circuit Capacity A.C. System

2.4 HVDC 18/SVC 2
Thyristor Aging Evaluation Criteria, Monitoring Method and Hardware Development

3. Extended Term of Chairman by One Year to December 1989.

Funding: CEA Project #ST-241, Working Group expenses funded by CEA.

Contact: Dr. T.H. Lee, P. Eng., NB Power
506-458-3245

5.7.1.9 Application of Herbicides to Control Unvanted Vegetation on Transmission Right-of-Way, Capsule Evaluation Program

Objective: To develop operational specifications and evaluate the application methods of Carbopaste/Roundup mixtures. Capsules are utilized and an appropriate injector will be determined.

Description: The application requirements of encapsulated herbicides for individual trees are to be studied. One particular type of herbicide is to be used. Various application methods with resulting effects are to be determined together with a treatment season.

Status: Two prototype injection tools have been manufactured. A first year evaluation of the effects of the herbicide using the first tool has been completed. A licence to manufacture and market the capsule system has been negotiated. The second year evaluation was completed in 1987. NB Power has 10,000 Carbopaste/Round up capsules which will be used during 1989 and the results evaluated.

Cost: $390,000

Funding: $217,000 CEA, $173,000 BC Hydro, $10,000 NB Power, (plus six additional utilities for their application costs)
CEA Project #173T517

Contact: W.M. Nason, P. Eng., NB Power
506-458-4367

5.7.1.10 Test Program for Generic Coal-Water Fuel

Objective: To develop coal water fuel from several coals. Successful development of generic coal water fuel will permit NB Power to procure coal from several alternative sources, store the coal on site, and manufacture coal-water fuel at site when it is required.

Description: Select and procure high-volatile low sulphur coals; develop coal-water fuel from these coals; test in a laboratory and commercial furnaces; and assess the economics of burning these fuels in boilers designed to burn oil.

Status: Phase 1 of the project, the testing of coal-water fuel, made from Nova Scotia coal, in a combustion furnace in Ottava by NRC and EMR Canada has recently been completed. These results should be available shortly.

Start: May 1988

Finish: Scheduled to complete testing in a commercial boiler in March 1990.

Funding: Should the project progress all the way to testing in a commercial size boiler, up to approximately $1.7 M could be required. Applications for partial funding have been made to the Federal Government. Contributions are anticipated from other interested utilities in both the U.S. and Canada.

Contact: D.M. Rankin, NB Power
(506) 458-4275

5.7.1.11 Develop Knowledge-Based Systems for Power Restoration

Objective: To develop an expert system using the current state of commercial Knowledge-Based Systems which will assist operators and service men to restore service to distribution customers who have lost that service due to power outages.

Description: In cooperation with UNB's School of Computer Science, NB Power is studying the possibility of developing an expert system as an on-line power system operational aid. This study will investigate the technical requirements of the power system, the current state of knowledge based technology, consider the appropriate interfaces, and determine the feasibility of application.

Status: Preliminary technical requirements of the power system have been assessed and a literature search and review of knowledge-based products have been conducted. Results from the power restoration prototype implemented on one system indicate that full-scale application would likely be feasible.

Start: June 1988

Finish: Ongoing, depending on continuing assessment of progress and advancements in the industry.

Funding: NB Power has spent approximately $20,000 to date. Further expenditure is budgeted for next year. Funding is being applied for.

Contact: Stewart MacPherson, NB Power
(506) 458-3241

5.7.1.12 Chatham C.F.B. Wood-Burning Demonstration

Objective: To evaluate the technical feasibility of burning processed wood waste in conjunction with coal and limestone or oil shale as sorbents in the Chatham Unit #3 Circulating Fluidized Bed using 100% wood fuel feed as a target.

Description: Implementation of a wood waste receiving system, short-term storage system and wood waste handling system onto the Chatham Circulating Fluidized Bed Unit in order to demonstrate the above.

Status: Currently in Engineering stage:

- In-plant wood Fuel Feed system ordered on July 7, 1988
- Tender Documents Issued: Yard Fuel Handling System
  Motor Control Center
  Pt. Lepreau Conveyor Modification
  Building Addition + Conveyor Supports/ Foundations
- All Other Tender Documents to be issued shortly.

Start: Fall, 1989

Finish: Summer, 1990

- 3 months in Fall, 1989
- 3 months in Winter, 1990
- 3 months in Summer, 1990

* Excluded Spring of 1990 due to road restrictions and lack of storage on site.

Funding: Original Cost Estimate: $2.5 million
Source: New Brunswick Electric Power Commission

Contact: Michel Losier, P. Eng., Project Engineer, NB Power
(506) 458-4440

5.7.1.13 Combustor Mapping Chatham CFB

Objective: To determine where and how sulphur capture takes place in the combustor at Chatham CFB unit.

Description: A study of Gas Concentration, Solids Loading and Temperature Profiles within the Chatham CFB combustor. Tests will be carried out within the combustor. Using water-cooled probes, concentration profiles of gas, temperature, and solids will be determined. The results will be used to gain an understanding of the mechanisms of combustion and in particular where and how sulphur capture takes place in the combustor.

Status: Preliminary work has begun.

Start: Testing is expected to begin in January 1989.

Finish: Expected completion in March 1989.

Funding: Estimated cost $55,598. Energy Mines and Resources (CANMET) are funding the project, which is being carried out by the Chemical Engineering Department at the University of New Brunswick. NB Power is providing access to and use of its CFB facility at Chatham.

Contact: R. Pickles, NB Power,
(506)458-3049

5.7.1.14 Mathematical Modelling of CFB Unit at Chatham

Objective: To develop models to predict the performance of the Circulating Fluidized Bed Unit at Chatham.

Description: This project will develop models to predict the performance of the Circulating Fluidized Bed Unit with respect to heat transfer, and sulphur capture. Tests will be carried out at the Chatham CFB Unit and actual performance results will be used to verify the models' predictions.

Status: Preliminary work was initiated in 1988.

Start: January 1989

Finish: Estimated Completion, March 1990.

Funding: Estimated cost $312,000, NSERC funded. Project to be performed by Chemical Engineering Department at the University of New Brunswick. Co-funding in the amount of $160,000 from NB Power.

Contact: R. Pickles, NB Power
(506)458-3049

5.7.2 NOVA SCOTIA POWER CORPORATION

5.7.2.1 Accelerated Material Evaluation of Polymer Insulators for Transmission Lines

Objective: To evaluate the effect of pollution on polymer insulators in a salt fog environment.

Description: NSPC is participating in this CEA R&D Project undertaken by IREQ (Hydro-Quebec). Six polymer insulators of three makes, Ohio Brass Hi-Lite, Ceraver Armourlite and Rosenthal Roderflex were installed hot by NSPC on L-7011 in the Lingan area in November 1982. One unit of each make was equipped with a corona ring.

Status: Project was completed on June 30, 1987.

Start: May 1982 Finish: June 1987

Funding: Cost $229,230, funded by Canadian Electrical Association (R&D Project No. 121-T-226).

Contact: W. Chappell, (NSPC).
902-876-7801

5.7.2.2 Circulating Fluidized Bed (CFB) Feasibility Study

Objective: To study the feasibility of circulating fluidized bed boilers for utility application in the 150 MWe size range. Specifically, instrumentation and control systems have been investigated to prove safe start-up, load-following, and flexibility capabilities of the system. Additionally, studies on the feedstock preparation and injection, dust collection, and waste disposal will be conducted.

Description: NSPC is managing the study under the general guidance of the CFB Management Board. An assessment of the capabilities of various manufacturers to build CFBs sized at 150 MWe has been examined. In addition, considerable monitoring of the Chatham project and test burns of Nova Scotia coal and limestone have been carried out.

Status: Initial technology review was issued and a detailed report on the Chatham test burn is now underway for publication. An additional allocation for ash test work to be completed by December has been approved and is well underway.

Start: October 1986

Finish: Scheduled for March 1989

Funding: Financial support will be provided through the offices of the Canada - Nova Scotia Agreement on Oil Substitution and Conservation (Oil Substitution Fund)

Contact: S.A. Fraser
902-428-6427.

5.7.2.3 Coal-Liquid Mixture Conversion Feasibility Study

Objective: To determine the technical and economic feasibility of firing coal-water fuel (CWF) in a utility steam generator.

Description: As part of the federally-funded coal-water fuel demonstration program centered on a combustion demonstration on the No. 10 Unit of Maritime Electric's Charlottetown, PEI Generating Station, NSPC undertook a paper study to evaluate the technical and economic problems/benefits of converting the 100 MW - No. 2 Unit at Tuft's Cove to coal-water fuel. Fenco-Shawinigan were commissioned to perform the study.

Status: Final report of the phase I Tufts Cove #2 study was recieved in May 1986. The Maritime Electric #10 combustion test program has been finalized and final reports issued March, 1988. However, the relative economics at this time do not encourage any further activity at Tufts Cove Generating Station. Hence the Tufts Cove #2 conversion study is on hold.

Funding: Funding ($8.8 million) for this program is provided by Energy, Mines & Resources Canada.

Contact: A. MacKenzie
902-428-6806

5.7.2.4 Control of Distribution Line Galloping

Objective: To obtain reliable observations of performance of promising control devices during galloping occurrences.

Description: Two galloping-control devices, the air-flow spoiler and the detuning pendulum have been installed on a six-span section of line in the Cheticamp area. Eighteen air-flow spoilers, three per span, and six detuning pendulums, one per span, were installed on different phases. The remaining phase with no devices installed will be used as a reference. Interphase spacers were installed on four other spans along the same section of line, making a total of 10 spans in the test.

These tests will determine the overall effectiveness of the control devices under natural galloping conditions, and provide recommendations on the application of these devices to eliminate or reduce the effects of galloping on existing and new distribution lines.

Status: A galloping occurrence was observed on 1986 01 22. A film of the occurrence was sent to Ontario Hydro Research for analysis. One of the interphase spacers has failed; unit sent to Ontario Hydro Research. No

galloping was reported on this line during 1987 or 1988. Observer refresher sessions were conducted by Ontario Hydro in October 1987 and 1988.

Start: March 1983

Finish: Expected completion and final report in 1989.

Funding: Material and monitoring equipment provided by Ontario Hydro under CEA contract. Control devices installed and monitored by NSPC. CEA Project No. 196D367.

Contact: K.S. Mathur, (NSPC).
902-876-7801

5.7.2.5 Evaluation of CCA and CCA-PEG Treated Scots and Red Pine Poles

Objective: To determine the acceptability of treatment from environmental and climbability points of view.

Description: 100 CCA-PEG treated Scots Pine poles were installed in the Clare District. The poles were initially inspected in accordance with CSA Standards O15.3 and O80 for physical defects and preservative penetration and retention requirements. Hardness measurements were taken using a Pilodyn Penetrometer and the Linemen's climbability perception was recorded.

Water and soil samples were taken in the area around the poles to determine leachability of the preservative.

The results of these tests will be used to determine if this type of preservative treatment is environmentally acceptable and helps the climbability of the pole.

Status: Commenced in 1986, poles were tested initially in the Spring and for climbability, soil and water samples in mid-Summer. Poles will be tested and monitored through 1988. In the fall of 1987, further tests were conducted with the Pilodyn Penetrometer, and a climbability survey of NSPC linemen was performed.

An additional 20 CCA and 225 CCA - PEG treated Red Pine Poles installed in 1988 and 235 CCA-treated Scots Pine Poles will be installed at several locations throughout the province for evaluation. Then poles will be tested in 1989.

Start: 1986

Finish: Expected 1989-90

Funding: NSPC in-house project.

Contact: K.S. Mathur, (NSPC).
902-876-7801.

5.7.2.6 Field Testing of Distribution Equipment and Line Materials in a Marine Atmosphere

Objective: To evaluate corrosion of equipment in a marine atmosphere.

Description: A 25 kV line along Inverness Beach feeding summer cottages has been fitted with varous components such as cutouts, lightning arresters, epoxy arms, insulators, connectors, clamps, etc., to study the effect of salt contamination under normal operating conditions. This experience will assist in the evaluation and selection of suitable materials for construction of distribution lines in seacoast areas.

Thirty-three powder-coated distribution transformers have been purchased with a polyester finish. They are being installed in salt and industrial-polluted areas in Eastern and Western Zones. Three additional powder-coated transformers were installed in the Peggy's Cove - Prospect area as part of CEA R&D Project 78-94 awarded to B.C. Hydro. Final Report published by CEA R&D (#78-94) in November, 1987.

Status: Powder-coated transformers were inspected, and evidence of rust was found on all transformers. The rust signs are quite evident at the bottom of the transformer tanks and near the transformer hanger brackets.

The powder-coated transformers were inspected in October 1987 by a representative of B.C. Hydro Research, who agreed with the earlier NSPC observations and conclusions concerning the severe rusting and corrosion. CEA R&D has been informed.

We have concluded that this type of paint does not provide adequate protection against corrosion due to salt contamination in our seacoast areas. The CEA R&D report #78-94 agrees with our conclusions.

We are still evaluating material installed at Inverness Beach. All equipment was inspected in 1988. Deteriorated equipment was replaced and new equipment was installed.

Funding: NSPC in-house project.

Contact: K.S. Mathur, (NSPC).
902-876-7801.

5.7.2.7 Field Testing of Insulators and Associated Equipment on 25 kV Distribution Lines in Coastal Salt Environment

Objective: To evaluate the effectiveness of CSR (Controlled Surface Resistance) insulators, cutouts, arresters, and transformer bushings as well as stainless steel transformer tanks, various synthetic suspension insulators, and connectors.

Description: Purchase and install controlled surface resistance (CSR) glazed insulators, cutouts and arresters, synthetic deadend insulators, stainless steel transformers and various connectors on a section of existing 25 kV line near Centreville, Digby County, N.S.

Performance of these insulators and equipment will be monitored and compared with the previous outage statistics of this line to determine the effectiveness of this equipment in salt-contaminated atmosphere. The results will provide power utilities with much-needed technical information to design and operate distribution lines in coastal areas with minimum interruptions due to salt contamination.

Status: Line was energized at 25 kV on 87-05-13. Monitoring equipment has not yet (Dec. 1988) been received from IREQ. Three CSR-insulated cutouts have flashed over, and replaced by 150 kV BIL NSPC standard 25 kV cutouts installed on a special no-track epoxy mounting bracket. Another interruption occurred Nov. 1988, actively under investigation.

The unpainted stainless-steel transformers are showing signs of rusting, especially on the bottom of the tank.

Start: Aug. 1986

Finish: Scheduled for 1991

Funding: Material purchase and installation CEA funded. NSPC is monitoring performance of equipment. (CEA Project No. 181-D-557)

Contact: K.S. Mathur, (NSPC).
902-876-7801

5.7.2.8 Marginal Cost-Based Peak Load Pricing and Load Control Study

Objective: To investigate the applicability of marginal cost pricing, time of use pricing, modeling techniques for load and sales forecasting, load management and load research to a utility and to determine how these systems can lead to more efficient utilization of the utility's energy resources.

Description: The study comprises the following modules:

- Cost of Service Study
- Marginal Cost Study
- Load Research Study
- Rate and Load Management Experiments
- Load and Sales Forecasting Study
- Overall Cost Benefit Study

Status: Project complete and Final Reports issued March 1988. The study has demonstrated the usefulness of load research data, experimented with water heater load management and developed analysis tools for evaluating demand side management programs.

Funding: Total of $3,225,000 funded 80% by Federal government and 20% by Province of Nova Scotia. Additional funding of $175,000 by the Oil Substitution and Conservation Agreement (EM&R) has been obtained to complete the project.

Contact: Jack Kiuru, (NSPC).
902-428-6172

5.7.2.9 Nova Scotia Add-On Plenum Heater Experiment

Objective: To test the application and effectiveness of dual-fuel systems, particularly oil and electric. This experiment will evaluate the capability of dual-fueled heating to reduce oil consumption while improving the utilization of coal-fired generation and reducing future peak loads.

Description: The add-on plenum electric heater installed in the supply duct or plenum of oil-fired hot air furnaces of 150 domestic residences allows this objective to be met while providing additional information on their cost effectiveness, convenience and acceptability to customers in Nova Scotia. In addition, 100 domestic customers have their furnace oil consumption monitored and serve as a control group to the basic study. The dual-fuel concept was expanded to include two hot water heat pump and five gas backup heat pump systems for commercial customers in the second phase of the experiment.

Status: The project was initiated in January of 1986 and the domestic field experiment was completed in August of 1988 with final reporting by February 1989. Installation of the first commercial sites began in November 1987. Data will continue to be collected at the Commercial installations through to the end of the agreement.

Start: January 1986

Finish: Scheduled for March 1989

Funding: Funding of $1,025,000 was provided by the Canada - Nova Scotia Oil Substitution and Conservation Agreement.

Contact: Jim Kirby (NSPC)
902-428-6664

5.7.2.10 Performance of Preservative-Treated White and Red Spruce Poles: Examination for Checking Toughness

Objective: To study the effectiveness of ACA preservative treatment for spruce poles and assess the severity of checks, shock resistance, moisture content and pathological condition.

Description: Approximately 144 ACA-treated spruce poles have been installed in the Guysborough Area (Dickie Brook line). These poles were cut in 1977-78 from Hants County, Nova Scotia. Incisions were made along the full length of the poles and full-cell treatment of ACA product was applied in accordance with CSA Standard O-80. The penetration depth averaged to 1.10 inches. Examination of the poles carried out in 1981 showed incised poles as moderately checking and non-incised poles as severely checking. Hardware removed from some poles in 1984 showed signs of corrosion. A common complaint from the linemen was the hardness of the poles and vertical splits making them difficult to climb.

Status: A report was prepared by Forinteck for the 1984 examination done on the poles. The report recommended another examination be done in 4-5 years as part of continuing their long-term performance evaluation. NSPC will continue to monitor performance. Galvanized steel bolts installed on the poles, and inspected in 1987, showed severe corrosion and were replaced. CEA may not extend this project any further and may combine this project with other pole inspection projects.

Start: Nov. 1978

Funding: Poles and installation funded by NSPC. Inspection and report funded by CEA R&D. CEA project cost $15,300. (Project No. 77-29A)

Contact: K.S. Mathur, (NSPC).
902-876-7801.

5.7.2.11 Test Burn of Nova Scotia Coal and Limestone at Chatham CFB

Objective: To conduct a test program to burn Prince Mine Coal and two limestones in the Circulating Fluidized Bed at Chatham, N.B.

Description: NSPC has selected coal from the Prince Mine as the most likely fuel for fluidized bed combustion and will in the near future select two potential limestones, based upon:

- Available reserves
- Transportation and quarrying costs
- Bench-scale tests of reactivity

A 1000-hour test program will be carried out at NB Power's Chatham CFB to combust the Prince Mine coal with the two potential limestones. Results of these tests will include:

- Process data which will permit calculation of carbon utilization, combustion efficiency, limestone utilization, sulphur capture, NO_x emissions and works power requirements.
- Substantial quantities of ash for subsequent testing by others.
- Qualitative observations of how the Prince Mine coal combusts versus other fuels including observed fuel-related material-handling problems.
- Erosion potential of fly ash.

Operation of the Chatham CFB and testing activities will be performed by NB Power staff. NSPC staff will manage the test and prepare all reports for the program.

Status: Test burns occurred in August 1988. Final report is in preparation for release in 1989.

Funding: Shared equally by NSPC and Department of Supply and Services. NB Power to issue credits for electricity generated during test runs.

Contact: S.A. Fraser, NSPC (902) 428-6427.

5.7.2.12 Coal Gasification Combined Cycle Study

Objective: IGCC is the cleanest of the emerging clean coal utilization technologies. Emissions of SO_x, NO_x and particulates in the flue gases are extremely low and additionally the improved cycle efficiency will result in reduced CO_2 emissions per kW. The aim of this project is to develop capital and operating cost estimates for optimum IGCC technologies applied at specified Western, Central and Eastern Canadian sites, based on an installation date of October 1995.

Description: The Eastern scenario is based on a Point Aconi location and Prince Coal. The following shall be produced:

1) Selection of the optimum technologies (considering capital cost, power costs, reliability, etc.) given the process/fuel characteristics and economics of the scenario assumptions. Only commercial or "near commercial" technology is to be considered.

2) A preliminary station design including overall flow diagram, site layout, performance projection and schedule.

3) Capital and operating cost estimates breakdown suitable for the Canadian marketplace based upon an installation date of October 1995 with a target accuracy of ± 20%. It is recognized that due to the emerging nature of this technology, this accuracy may not be achievable on all components.

4) A typical staged construction plan which would permit the consideration of staging construction and investment to meet the utility's needs.

5) A summary of potential improvements (heat rate and busbar power cost) based on developing technology and identification of R&D requirements in these areas.

Status: Awarded to Bechtel. Preliminary data being assembled.

Start: November, 1988

Finish: September, 1989 (scheduled)

Funding: Total $250,000. N.S. Dept. of Mines and Energy contribution $50,000 (Oil Substitution Fund). Other agencies include CEA, Environment Canada, CANMET, Ontario Hydro, Ontario Ministry of Energy, Transalta, Alberta Government, Coal Gasification Committee. CEA R&D Project No. 811G 659.

Contact: D.K. Blamire (902) 428-6655

5.7.2.13 Fish Diversion Study at Hell's Gate Hydro Electric Station

Objective: To develop an effective fish bypass around Hell's Gate turbines for junior alewife.

Description: A fish bypass structure was installed at the Headpond dam. A fish behavioural deterrent device was used in 1987 to divert over 1,000,000 juvenile alewife from the intake to the fishway entrance. Testing was continued in 1988 to optimize design.

Status: All 1988 testing is complete. The size of the run was almost 7,000,000 fish this year. The sheer numbers reduced the effectiveness of the deterrent devices such that extra effort resulted in only 78% diversion of the run to the fishway entrance. A final report will be produced in February 1989.

Start: 1987

Finish: Scheduled for February 1989.

Funding: Nova Scotia Power funded the total project cost of $10 000 and provided staff support for the project.

Contact: T.P. Toner (NSPC)
902-428-6744

5.7.2.14 Fish Diversion Studies at Annapolis Tidal Generating Station

Objective: Determine the temporal and spatial distribution of designated fish species as they migrate past the Annapolis Generating Station. Optimize configuration of behavioral devices to divert fish from the turbine intake.

Description: Hydro acoustic (Sonar) and net techniques were used to determine the precentage of fish using sluiceway vs percentage using turbine. Four behavioral devices were installed in front of the turbine and their effectiveness was tested.

Status: All 1988 field work was completed. Preliminary results were encouraging for adult fish, but less conclusive for juveniles. Report due in February, 1989.

Start: 1987

Finish: Scheduled for February 1989.

Total Cost: $105,000

Funding: Tidal Power Corporation 99 000
Nova Scotia Power 6 000 (and considerable staff support)

Content: T.P. Toner (NSPC)
902-428-6744

5.7.2.15 Herbicide Capsule Evaluation Program

Objective: To evaluate the cost and efficiency of the herbicide capsule injection system to control various species of unwanted vegetation.

Description: Appropriate locations will be selected and three trees/species in each group of 10 trees will be injected with Glyphosate capsules. Results will be evaluated after two growing seasons.

Status: Preliminary application of 100 capsules discovered that they would not penetrate the bark. Modified screw worked better but application was slower. CEA has been notified.

Awaiting approval from Agriculture Canada to proceed with application - Elyphosate is okay, but formulation is subject to approval and permit will be required from Nova Scotia Department of the Environment for 1989.

Start: 1987

Finish: Scheduled for 1989.

Funding: Capsules and tools provided by CEA R&D project 173 T 517A. Labour by NSPC.

Contact: Kevin Penny (NSPC)
902-876-7801

5.7.3 MARITIME ELECTRIC COMPANY, LIMITED

5.7.3.1 Atlantic Wind Test Site - North Cape, P.E.I.

Objective: Testing of wind turbuine generator performance, development of instrumentation systems for data acquisition and control of these machines, structural dynamics testing, and world-wide project management for windsystens.

Description: This is a national facility available to government and private industry for field testing wind turbine generators. Laboratory facilities provide remote data acquisition for detemination of unit performance. MECL has agreed to purchase output on an "energy displacement" basis and provides technical assistance on an "as required" basis.

Status: Operation continues. Modifications to a 500 kW unit to install a "high energy" rotor are being carried out to be followed by testing. A Canadian made, ADECON 150 kW machine installed in December 1988 and a 30 kW German-made, MBB high efficiency, single-blade machine are undergoing testing. A wind-diesel unit is currently being adapted for autonomous operation.

Start: Ongoing.

Finish: Ongoing.

Funding: Site is operated by Resource Ventures Ltd. with the assistance of an operating grant from Energy Mines and Resources on land leased from the P.E.I. Government.

Contact: R. D. Vance (MECL)
902-566-1599

5.8 SUMMARY OF CURRENT CEA R&D PROJECTS WITH UTILITY STAFF INVOLVEMENT

5.8.1 NEW BRUNSWICK POWER

NOTE RE CONTACT PERSON: (A) = Technical Advisor, (B) = Corresponding Technical Advisor, (C) = Task Force Member, (D) = Utility Evaluator, (E) = Utility Co-ordinator

NUMBER	TITLE	FUNDING	COMPLETION DATE	CONTACT PERSON
104G300	Flame Scanners for Coal-Fire Monitoring	$ 895,000	88-12	L.J.Griesbach (A) P. Eng. 506-458-3291
190G363	Brushgear Diagnostic Testing	$ 203,600	88-03	D.V. Tran (A) P. Eng. 506-458-3014
302G401	Optimization of Welding Procedures for Hydraulic Turbines	$ 150,000	88-08	F.B. Harriman (A) P. Eng. 506-363-3093
218G408C	Boiler Tube Erosion Evaluation	$ 292,600	88-08	B.A. Kennedy (B) P. Eng. 506-684-3387
419G485	Robotic System for the In-Situ Repair of Hydraulic Turbine Runners	$ 620,000	89-02	F.B. Harriman (B) P. Eng. 506-363-3093
618G605	Investigation of Cable Fire Protection Coatings	$ 166,000	89-06	B.D. Webber (A) 506-458-4393
634G568	Turbine Blade Repairs - Phase I	$ 300,000	88-03	G.J. Ross (B) P. Eng. 506-458-3019
804G644	Technical Options for the Disposal of CFB Wastes	$ 130,000	89-12	C.C. Doiron (A) 506-458-3021
143T250	Earth Resistivity, Canadian Soils	$ 133,500	88-02	J. Crousse (E) P. Eng. 506-458-4482
143T259	Battery Ground Locator	$ 39,600	88-06	K.A. Hooper (D) P. Eng. 506-458-4439
143T331	EMTP Program Developments (Phase A)	$ 1,736,000	87-12	W. Marshall (E) 506-458-3431 L. Denton (E) 506-458-4387

NUMBER	TITLE	FUNDING	COMPLETION DATE	CONTACT PERSON
179T382	Lightning Ground Flash Density Measurements in Canada	$ 461,000	89-03	D.E. Clark (C) P. Eng. 506-458-4085
203T421	H.V.D.C. Wall Bushings	$ 245,800	87-05	M.N. Campbell (D) P. Eng. 506-458-4220
210T422	H.V.D.C. Converter Station Electromagnetic Environment	$ 225,260	87-10	Dr. T.H. Lee (D) P. Eng. 506-458-3245
243T484	Instrumentation for Grounding Measurements	$ 77,900	87-12	A.L. Gilliss (B) P. Eng. 506-458-4279
222T506	Reliability Assessment of H.V.D.C. Configurations	$ 72,570	87-09	Dr. T.H. Lee (D) P. Eng. 506-458-3245
260T507	Gas-In-Oil Analysis	$ 110,000	88-01	M.N. Campbell (B) P. Eng. 506-458-4220
252T531	Environmental Planning of Right-of-Way	$ 84,300	87-09	W.J. Borland (D) 506-458-3256
264T534	Investigation of Worker Reaction to H.V. Field Induced Transient Electric Currents	$ 18,780	88-06	R.J. Carr (E) 506-458-4370
133T386	Field Trials of Galloping Control Devices for Bundled Conductor Lines	$ 180,000	89-12	E. Roussel (E) 506-458-3306
214T565	Field Tests and Performance assessment of Metal Oxide Gapless Surge arrestors for 250 KV DC and above	$ 125,000	88-09	Dr. T.H. Lee (D) P. Eng. 506-458-3245
173T567	An Investigation of the Stability of Plant Communities on Transmission Line Rights-of-Way	$ 67,320	88-11	W.C. Bidlake (A) C.E.T. 506-458-3464
293T592	Epidemiological Studies of Incidences of Electric Shock	$ 45,000	88-11	R.J. Carr (E) 506-458-4370

NUMBER	TITLE	FUNDING	COMPLETION DATE	CONTACT PERSON
294T622	Investigation of Lov Frequency Inter-Area Oscillation Problems in Large Inter-Connected Power Systems - Phase I	$ 189,420	90-07	D.H. Thorne (A) P. Eng. 506-458-4438
304T639	Field Verification of Exciter Models			E. Bourque (A) (506)458-3165
180D579	Development of an Influence Vector for the Electrical Co-ordination of Power and Telecommunication System	$ 100,000	88-12	W.N. Snowdon (E) P. Eng. 506-458-4378
068D129	Development of an Environmentally Acceptable Wood Pole Groundline Preservation Formulation	$ 16,500		E. Roussel (A) (506)458-3306
413U459	Applications of Water Heating	$ 83,000	87-06	R. Gulliver (A) 506-458-4279
649U587	Development of Retro-fitable Proportional Controls/Elements for Residential Central Heating and Low Energy Housing	$ 54,000	89-06	G.M. Dashner (A) 506-458-3285
716U629	Investigation of Electro-Osmosis and its Application	$ 20,000	88-09	R.E.C. Little (B) P. Eng. 506-458-4293

Work Groups, Task Forces and Advisory Panels

NUMBER	TITLE	COMPLETION DATE	CONTACT PERSON	FUNCTION
	Flue Gas Emissions Control Advisory Panel	N/A	G. Gunter P. Eng. 506-458-4381	Member
614G-31	Review of Dust Suppression Techniques for Coal and Ash in Coal Fired Generating Stations	87-08	E.R. Pickles P. Eng. 506-458-3049	Technical Advisor
	Environmental Work Group	N/A	E.R. Pickles	Member
WG140	Working Group-HVDC and Static Var Compensator	N/A	Dr. T.H. Lee P. Eng. 506-458-3245	Chairman
			R.E. Haggerty P. Eng. 506-458-4302	Liaison Member
WG234	Transformer Overload		M.N. Campbell	Member
ST202A	Future Research From "Resistance to Oxidation of Reclaimed Transformer Oils"		M.N. Campbell P. Eng. 506-458-4220	Technical Evaluator
			R.E. Haggerty P. Eng. 506-458-4302	Liaison Member
ST259	Evaluation of Safe Working Clearances	87-08	P.R. Hickey P. Eng. 506-458-3189	Utility Co-ordinator
			R.J. Carr 506-458-4370	Utility Co-ordinator
ST272	Task Force-Electric and Magnetic Fields	88-04	J.V. Burnham 506-458-4388	Corresponding Technical Advisor
700U	Demand Side Management (DSM) Task Force	N/A	R.E.C. Little 506-458-4293	Chairman (Acting)
138D375	Cable Ampacity Task Force	N/A	J.M. Williamson 506-458-3294	Member

5.8.2

NOVA SCOTIA POWER CORPORATION

NUMBER	TITLE	FUNDING	TECHNICAL ADVISOR
112G277	Internal Treatments of Desuperheaters to Prevent Exfoliation	$ 100,000	P.F. Stout (c)
187G294B	Investigation of Dry Deposition Fluxes	$ 617,000 $ 335,000 (C.F.)	O.J. Betancourt
104G300	Flame Scanners for Coal Fire Monitoring	$ 550,000 $ 200,000 (C.F.)	P.F. Stout (c)
218G408	Boiler Tube Erosion Evaluation	$ 292,600	I.D. Covill
309G409	Rockwell Combustor Program	$ 560,000 $ 140,000 (C.F.)	D.K. Blamire (c)
516G515	Coal Combustion Research	$ 300,000 $3,300,000 (C.F.)	I.D. Covill
634G568	Steam Turbine Blading Repairs	$ 300,000	W.C. Harris (e)
601G569	Review of Environmental Monitoring Equipment	$ 120,000	G.J. Lajeunesse (e)
702G606	In-situ Non-Destructive Inspection of High-Temperature Bolts	$ 30,000	W.C. Harris
703G607	Tightening Strain Measurement Techniques for High-Temperature Bolting	$ 30,000	W.C. Harris
712G619	Sorbent Injection for SO_2 Control	$ 37,000 $ 123,000 (C.F.)	D.K. Blamire
522G623	Development of an Expert System for Improved Steam Temperature Control in Coal-Fired Generating Stations	$ 60,000	A.J. Farmer
801G658	Turbine Fish Passage Research	$ 126,000	T.P. Toner (c)
734G643	Participation in a Eulerian Field Study Evaluation Programming	$ 72,000	O.J. Betancourt
0231217	Simulation of Reradiation of Broadcast Signals by Power Lines	$ 115,131	H.F. McMullon

NUMBER	TITLE	FUNDING	TECHNICAL ADVISOR
207T483	Transmission Line and Station VHF Noise	$ 286,949 $ 600 (C.F.)	H.F. McMullon
175T331	EMTP Development Coordination Group	$1,036,000 $5,964,000 (C.F.)	D.J. Mader
ST137	Position Paper on Lightning Performance of Transmission Lines Without Overhead Groundwires	$ 5,000	D.J. Mader (Author)
042T178	Development of an Arc Furnace Model	$ 60,000	R.W. Creighton
179T382	Lightning Ground Flash Density Measurements in Canada	$ 395,081 $ 60,000 (C.F.)	N. Creasy
173T517A	Herbicide Capsule Evaluation Program	$ 26,000	G.K. Penney (c)
714U628	Technological Impact of Superconductivity Above Liquid Nitrogen Temperature - Analysis of Opportunity Cases	$ 110,000 $ 110,000 (C.F.)	J. Fraser
805U	Plenum Heater - Dual Fuel Experiment	$ 7,000 $1,025,000 (C.F.)	J.E. Kirby (i)
8903U	Electric Water Heater Quality Evaluation	$ 45,000	D. Barteaux (E)
8905U	Feasibility of Main Service Ground Fault Protection on the Electrical Service to Dwelling Units	$ 60,000	D.R. Conrad (E)
835U	Power Quality: Issues and Opportunities	$ 24,000	J.C. Fraser
825U	Experimental and Analytical Investigation of the Thermal Performance, Energy Consumption and Economic Feasibility of R-2000 Houses Equipped with Head Pumps	$ 21,115 38,295 (C.F.)	P.J. Elliott * J.C. Fraser * * NSPC Liaison

NUMBER	TITLE	FUNDING	TECHNICAL ADVISOR
109D355	Charge-Operated Fault Arc Diverter for Padmount Transformers	$ 120,000 $ 30,000 (C.F.)	H. Guilderson
190D392A	Application of Robotics to Distribution Systems - Stage 2	$1,000,000 $2,700,000 (C.F.)	W. Chappel
124D447A	Acoustic Emission of Man lifts with Fibre-Reinforced Plastic Booms	$ 110,000 27,000 (C.F.)	

Work Groups, Task Forces and Advisory Panels

	Flue Gas Emissions Control Advisory Panel	D.K. Blamire
	Acid Rain R&D Review Task Force	O.J. Betancourt
430U	5-Year Plan Task Force	J.C. Fraser
700U	Demand-Side Management Task Force	P.J. Elliott
TF272E	Environmental Engineering Task Force	N.I. Creasy
SD-4C	Std. Spec. for Deadend Polymer Insulators	D. Laking
SD-118	Utility Poles	K. Mathur

ABBREVIATIONS: C.F. - Co-funding
(c) - Corresponding T.A.
(e) - Evaluation
(i) - Project Interface

5.9

CEA R&D SUBCOMMITTEE MEMBERS

SUBCOMMITTEE	NB POWER	TEL. NO.	NSPC	TEL. NO.
Management Board	D.G. Hayward	506-458-4246	T.F. MacDonald	902-428-6933
Distribution	W.N. Snowdon	506-458-4378	C.J. Courtney	902-876-7801
Generation	E.R. Pickles	506-458-3049	I.D. Covill	902-428-6625
Transmission	R.E. Haggerty	506-458-4302	R.W. Creighton	902-428-6871
Utilization	V.E. Corey	506-458-4352	J.C. Fraser (Chairman)	902-428-6876